## Creating a new image

***By Arrin Brunson***

After eight years of work and four years of silence, an inventor at Utah State University is happy to talk about the new patent that resulted from his discovery.

Robert Pack, a research professor in the College of Engineering at Utah State and engineer at the Space Dynamics Laboratory, co-invented a three-dimensional camera with his brother Brent Pack, a retired electrical engineer. Until the patent was received by Utah State University recently, the Pack brothers kept their unique technology under wraps, lest some competitor catch wind of the idea, Robert Pack said.

The multispectral imaging technology is called Lidar ElectorOptic Fusion Sensor, or LEFS. It uses a laser system and a color imager to capture 1,000 shots per second, compared to 25 images per second in video. Using hardware and software developed by the Packs, the LEFS system synchronizes the information to build 3-D images. Existing technology in this area requires a computer to spend hours transforming the raw data into a three-dimensional image. The new technology is revolutionary, Robert Pack said, because users will be able to produce a 3-D image immediately.

"This type of camera enables instant 3-D images to be acquired from moving vehicles such as airplanes or trucks," said Pack.

LEFS could revolutionize the world of military reconnaissance, movies, video games, disaster response, homeland security and geological surveying, the area which inspired the Pack brothers.

"I ran a company for 10 years that did geological and aerial surveying," Pack said. "We were always fighting to get good survey information from under trees and in rough country. Every time I flew off in a helicopter and looked down through the trees I thought, there has got to be a better way."

The hardware and software was born out of necessity, Pack said.

"We felt this was something that was really needed," he said. "It really shocked us when we found out no one was doing anything similar and no one even knew what we were talking about."

Pack and his brother decided to move the technology to Utah State six years ago to incubate, develop, patent and market it. The invention has already found a niche in the space industry, Pack said.

"We joined up with the company that puts cameras on the space shuttle and right now we're exploring opportunities for maybe building one of these for the space shuttle," he said.

The space industry could use it for docking space craft, it would be an important tool for disaster relief and newscasters could insert images into live segments. The uses are almost endless, Pack said. Filmmakers could create 3-D special effects from real objects; the gaming industry could use real topography in video games instead of creating it virtually.

"This technology can be used everywhere." Pack said.

One of the first organizations interested in the technology was the Department of Defense, Pack said. Presentations were made to the DoD, and a three-year contract to develop this camera for use in a cruise missile was procured over a year ago with the Naval Warfare System.

"Each of these missiles costs over a million dollars, not to mention the cost of lives. When they (military personnel) target things remotely, with a mobile target, things change," Pack said. "We are the only 3-D camera technology that works in a dynamic environment such as a missile or aircraft."

The 3-D technology will allow military personnel to find a tank hidden under a tree canopy, Pack explained. As the camera is flying overhead it will get a glimpse of what is under that tree. It will be able to pick up the image from under the tree and tell the computer where that object was hidden. When it flies over again and sees the object from the different angle, it will be able to identify it.

"Without having a third dimension to the photography, you couldn't put two and two together," said Pack. "It will help the military, homeland security and other organizations understand complex landscapes."

The Utah Center for Advanced Imaging Ladar was created last July to market this technology. The patent was obtained through Utah State University Research Foundation's Office of Technology Management and Commercialization. Its role is to patent, license and promote Utah State University's and the Research Foundation's technologies.